INSTALLATION, OPERATING
and
SERVICE MANUAL

THE INSTALLATION OF THE UNIT SHALL BE IN ACCORDANCE WITH THE REGULATIONS OF THE AUTHORITIES HAVING JURISDICTION.

OIL-FIRED LOWBOY - HEAVY DUTY FURNACE
MODEL NL4

HEAD OFFICE
MARKETING / PRODUCTION
Newmac Mfg. Inc.

DEBERT AIR INDUSTRIAL PARK,
LANCASTER CRESCENT
P.O. BOX 9, DEBERT
NOVA SCOTIA, BOM 1G0
PHONE: 902-662-3840
FAX: 902-662-2581

WAREHOUSE
Newmac Mfg. Inc.

430 SPRINGBANK AVE., SOUTH
P.O. BOX 545
WOODSTOCK, ONTARIO
N4S 7Y5
PHONE: 519-539-6147
FAX: 519-539-0048

EMAIL: newmac@ca.inter.net

HOMEPAGE: newmacfurnaces.com

NOTICE TO HOMEOWNER
READ AND SAVE THESE INSTRUCTIONS

NRTL/C
156156

2210268 REVISED MARCH 2008

Printed:_____

Table 1 - NL4 GENERAL INSTRUCTIONS - RIELLO AND BECKETT

MODEL	RIELLO BURNER	BTUH OUTPUT	BTUH INPUT (USGPH)	NOZZLE	PUMP psi	INSERTION inches To Flange	BURNER AIR SETTING		CHIMNEY FLUE PRESSURE (in wc)	GROSS STACK °F	FILTER SIZE (QTY)	BELT DRIVE**		EXTERNAL STATIC PRESSURE (in wc)
							TURBT'R	AIR DAMPER				PULLEY COMBINATION	TURNS OPEN(Belt)	
NL4-325	40F10	326,000	377,770 (2.71)	Delavan 2.25 X 60° W	145	*9-1/2"	4	4.2	-0.04	530	16" X 24" (4)	3-1/2" X 8"	2.5 (B49)	0.25
												-	-	0.50
NL4-290	40F10	293,000	335,950 (2.41)	Delavan 2.00 X 60° W	145	*9-1/2"	3.5	3.4	-0.04	490		3-1/2" X 8"	4 (B49)	0.25
												-	-	0.50
NL4-250	40F10	256,000	292,740 (2.10)	Delavan 1.75 X 60° W	145	*9-1/2"	2.5	3.1	-0.04	430		3-1/2" X 8"	5.5 (B48)	0.25
												3-1/2" X 8"	2.5 (B49)	0.50
NL4-220	40F10	222,000	252,310 (1.81)	Delavan 1.50 X 60° W	145	*9-1/2"	2	2.8	-0.04	400		3-12" X 8"	7 (B48)	0.25
												3-1/2" X 8"	4 (B49)	0.50

MODEL	BECKETT BURNER NM901 AFG-	BTUH OUTPUT	BTUH INPUT (USGPH)	NOZZLE	PUMP psi	INSERTION inches To Flange	BURNER AIR SETTING		CHIMNEY FLUE PRESSURE (in wc)	GROSS STACK °F	FILTER SIZE (QTY)	BELT DRIVE**		EXTERNAL STATIC PRESSURE (in wc)
							SHUTTER	AIR BAND				PULLEY COMBINATION	TURNS OPEN (Belt)	
NL4-305	AF104XPSS	302,000	348,500 (2.50)	Delavan 2.50 X 70° B	100	9-1/2"	0	6	-0.04	520	16" X 24" (4)	3-1/2" X 8"	2.5 (B49)	0.25
												-	-	0.50
NL4-275	AF104XPSS	272,000	313,650 (2.25)	Delavan 2.25 X 70° B	100	9-1/2"	0	4	-0.04	470		3-1/2" X 8"	4.5 (B49)	0.25
												-	-	0.50
NL4-245	AF104XPSS	245,000	278,800 (2.00)	Delavan 2.00 X 70° B	100	9-1/2"	0	3	-0.04	420		3-1/2" X 8"	6 (B48)	0.25
												3-1/2" X 8"	2.5 (B49)	0.50
NL4-215	AF104XPSS	215,000	243,950 (1.75)	Delavan 1.75 X 70° B	100	9-1/2"	0	3	-0.04	390		3-12" X 8"	7 (B48)	0.25
												3-1/2" X 8"	4 (B49)	0.50

Use burner air settings as a guide only. Initially set burner air to give a trace of smoke. Then re-adjust burner air to reduce CO_2 by 1 to 1.5 percent. Take measurements with the burner cover installed (if any). Select blower speed to suit installation requirements. Air temperature can be lowered by increasing the blower speed, lowering the firing rate, or increasing supply & return outlets. The minimum recommended return air temperature is 60°F.
The maximum allowable air temperature rise is 85°F. The minimum recommended air temperature rise if 65°F.
*9-3/8" to Riello gasket **See Table 2 - NL4 BLOWER PERFORMANCE

Table 1 (continued) - NL4 GENERAL INSTRUCTIONS - AERO, CARLIN

MODEL	AERO BURNER	BTUH OUTPUT	BTUH INPUT (USGPH)	NOZZLE		PUMP psi	INSERTION inches To Flange	BURNER AIR SETTING		CHIMNEY FLUE PRESSURE (in wc)	GROSS STACK °F	FILTER SIZE (QTY)	BELT DRIVE**		EXTERNAL STATIC PRESSURE (in wc)
								SHUTTER	AIR BAND				PULLEY COMBINATION	TURNS OPEN (Belt)	
NL4-300	HF-US-4	302,000	348,500 (2.50)	Delavan	2.50 X 70° B	100	9-1/2"	-	-	-0.04	520	16" X 24" (4)	3-1/2" X 8"	2.5 (B49)	0.25
													-	-	0.50
NL4-270	HF-US-4	274,000	313,650 (2.25)	Delavan	2.25 X 70° B	100	9-1/2"	-	-	-0.04	470		3-1/2" X 8"	4.5 (B49)	0.25
													-	-	0.50
NL4-240	HF-US-4	246,000	278,800 (2.00)	Delavan	2.00 X 70° B	100	9-1/2"	-	-	-0.04	420		3-1/2" X 8"	6 (B48)	0.25
													3-1/2" X 8"	2.5 (B49)	0.50
NL4-210	HF-US-4	215,000	243,950 (1.75)	Delavan	1.75 X 70° B	100	9-1/2"	-	-	-0.04	390		3-12" X 8"	7 (B48)	0.25
													3-1/2" X 8"	4 (B49)	0.50

MODEL	CARLIN BURNER	BTUH OUTPUT	BTUH INPUT (USGPH)	NOZZLE		PUMP psi	INSERTION inches To Flange	BURNER AIR SETTING		CHIMNEY FLUE PRESSURE (in wc)	GROSS STACK °F	FILTER SIZE (QTY)	BELT DRIVE**		EXTERNAL STATIC PRESSURE (in wc)
								HEAD BAR	AIR BAND				PULLEY COMBINATION	TURNS OPEN (Belt)	
NL4-295	EZ-3	301,000	348,500 (2.50)	Delavan	2.50 X 70° B	100	9-1/2"	2.50	2.50	-0.04	520	16" X 24" (4)	3-1/2" X 8"	2.5 (B49)	0.25
													-	-	0.50
NL4-265	EZ-3	271,000	313,650 (2.25)	Delavan	2.25 X 70° B	100	9-1/2"	2.25	2.25	-0.04	470		3-1/2" X 8"	4.5 (B49)	0.25
													-	-	0.50
NL4-235	EZ-3	242,000	278,800 (2.00)	Delavan	2.00 X 70° B	100	9-1/2"	2.00	2.00	-0.04	420		3-1/2" X 8"	6 (B48)	0.25
													3-1/2" X 8"	2.5 (B49)	0.50

Use burner air settings as a guide only. Initially set burner air to give a trace of smoke. Then re-adjust burner air to reduce CO_2 by 1 to 1.5 percent. Take measurements with the burner cover installed (if any). Select blower speed to suit installation requirements. Air temperature can be lowered by increasing the blower speed, lowering the firing rate, or increasing supply & return outlets. The minimum recommended return air temperature is 60°F.
The maximum allowable air temperature rise is 85°F. The minimum recommended air temperature rise if 65°F.
*9-3/8" to Riello gasket **See Table 2 - NL4 BLOWER PERFORMANCE

Table 2 - NL4 BLOWER PERFORMANCE

BELT DRIVE BLOWER	BLOWER MOTOR (pulleys)	MOTOR PULLEY TURNS OPEN (Belt)	RPM	STATIC PRESSURE (IN. W.C.)	CFM	A/C TONS
DELHI G15-10	1-1/2 HP (8 x 3-1/2")	2 (B49)	770	0.50	2,800	7
		3 (B49)	740		2,600	6.5
		4 (B49)	710		2,400	6
		5 (B48)	670		2,200	5.5
		6 (B48)	630			
		7 (B48)	600			
DELHI G15-10	1-1/2 HP (8x 3-1/2")	2 (B49)	770	0.25	3,400	
		3 (B49)	740		3,100	
		4 (B49)	710		2,800	
		5 (B48)	670		2,600	
		6 (B48)	630		2,400	
		7 (B48)	600		2,300	

USE ONLY TYPE B BELTS SIZE B48 OR B49
*DO NOT OPERATE THE BLOWER MOTOR PULLEY AT LESS THAN 2 TO (TURNS OPEN) AS THE BELT WILL NOT SEAT PROPERLY AND THE MOTOR MAY OVERLOAD

FURNACE INSTALLATION

IMPORTANT

Please read this entire manual and all labels before installing the furnace. Due to Newmac's constant improvement program, specifications may change. Check with your supplier for latest information. Typical installation information is provided as an example. Ensure that the actual installation conforms to applicable codes and good practice.

UNPACKING AND INSPECTION

It is the responsibility of the consignee of the furnace unit to examine the packages for damage and, if found, to note the same on the Carrier's Bill of Lading. The furnace is shipped complete with oil burner, draft regulator, air filters, and instruction manual.

HEAT LOSS

Before installation, verify that the furnace output capacity meets the building heat loss requirements. A detailed heat loss analysis is recommended.

INSTALLATION REGULATIONS

This furnace should be installed in accordance with the regulations of the authority having jurisdiction. In Canada the installation must conform to the CSA Standard B139, "The Installation Code for Oil Burning Equipment." In the United States, the National Fire Protection Association Standard NFPA 31 should be followed. Check with provincial, state, or local codes concerning clearances, venting system requirements and other regulations governing installation. Some requirements may vary from those described in this manual.

FOUNDATION

A dry cement pad is recommended. Ensure that the furnace is supported by a level foundation and is above any possible dampness.

MINIMUM CLEARANCES TO COMBUSTIBLES

	One Side	Rear	Top	Front* and Other Side	Flue Pipe	Floor
NL4	6"	32"	2"	24"	9"	Non Combustible
*Measure from panel on which burner is installed. Allow sufficient room at the front, side and rear for servicing access.						

FOR YOUR SAFETY: Do not store or use gasoline or flammable vapors and liquids in the vicinity of this or any other appliance.

VENTING PRODUCTS OF COMBUSTION - CHIMNEY

The NL4 furnace should be installed on a chimney flue capable of sustaining the required minimum negative draft flue pressure of –0.04 inches of water column (ins wc). A negative over-fire pressure should be maintained. Locate the furnace as close to the chimney or flue as possible. Do not extend the flue pipe beyond the inside wall of the chimney. Refer to Table 7(a) and Table 7(b) for proper sizing and Figure 15 for optimizing chimney draft. The owner shall provide a chimney constructed to comply with the following typical code specifications:

(a) The chimney must be smoke tight throughout its entire length, and must extend at least three feet (3') above a flat roof or two feet (2') above roofs within 10 feet.

(b) If built of a single thickness of brick or of cement blocks, it shall be lined throughout its entire length with an approved lining, such as fire clay having not less than three-fourths inch (3/4") thickness. Fire clay lining is to be laid in mortar and made air-tight. If the chimney is of the prefabricated type, it must be an approved class "A" chimney or Type "L" Vent for interior.

(c) The chimney or furnace flue must not have any other openings for attaching any fireplace, stove, range, gas or ventilating connection unless that equipment is appropriately certified.

(d) If it is necessary to offset the flue, it must be done in such a manner as not to reduce the gross cross-sectional area or create a ledge or obstruction, where loose material may lodge.

(e) Each flue pipe connection must be secured with 3 metal screws.

CAUTION: Oil-fired appliances shall be connected to flues or vents having sufficient draft at all times to ensure safe and proper operation of the appliance.

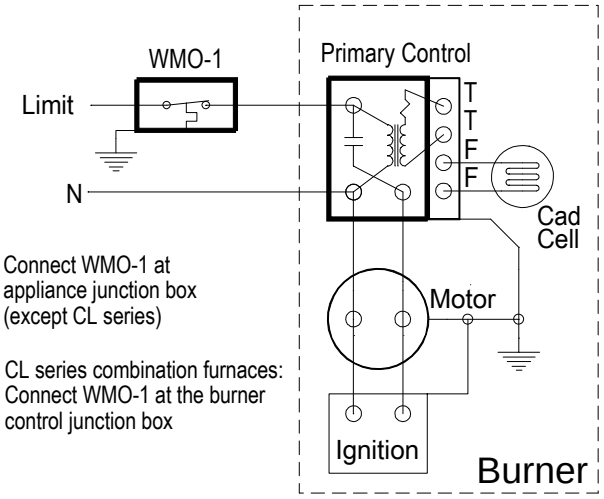
FURNACE CONNECTION

FLUE PIPE – CHIMNEY VENT CONNECTOR
Unless otherwise permitted by the installation code, use 8 inch diameter flue pipe (vent connector) to connect to the chimney. Install the flue pipe with a gradual rise of at least 1/4" per foot from the furnace to the flue. The maximum draft is obtained by keeping flue pipe elbows and pipe length to a minimum.

BAROMETRIC DRAFT REGULATOR
A listed/certified draft regulator must be installed in the flue pipe between the appliance and the chimney, within easy reach for adjustment and kept free from obstruction. Larger or multiple draft regulators may be used for chimneys with strong draft. Follow the manufacturer's instructions located with the draft regulator for proper installation

BLOCKED VENT SWITCH
The WMO-1 blocked vent control is required on Newmac oil-fired and combination furnaces or boilers installed in Canada. The WMO-1 switch must be installed on the chimney vent pipe for Newmac oil fired furnaces and boilers; and installed on the burner plate for Newmac combination wood/oil or coal/oil fired furnaces. Do not use the WMO-1 Blocked Vent Switch with the Newmac Sealed Vent System (SVS). Refer to the Newmac and Field Controls Instructions enclosed in the WMO-1 package.

Wiring WMO-1



PROPER DUCT SIZING
Locate the furnace as close as possible to the center of the heat distribution system and make sure the top is level. Refer to TABLES 5 and 6, DUCT SIZING FOR HEATING and COOLING in this manual.

FUEL
Fuel not heavier than No. 2 fuel oil must be used.

FUEL TANK
The oil supply tank must be of an approved type, ULC labeled in Canada and ULI labeled in the United States. Install the tank or tanks fill and vent piping according to local codes and regulations. Keep the tank at least 1/4 full.

OIL SUPPLY LINE
Install oil supply pipe according to local codes. If used, oil return lines, unless otherwise required by the tank listing, should be of the same diameter and extend to the same depth in the tank as the burner oil supply pipe. An

emergency oil shut-off valve should be installed as required by local ordinance. This can be manual, electric solenoid, or vacuum operated. To reduce vibration, form a horizontal loop in copper oil lines connected directly to the oil pump. For multiple appliances, use a separate oil line for each individual appliance to prevent "loss of prime" problems.

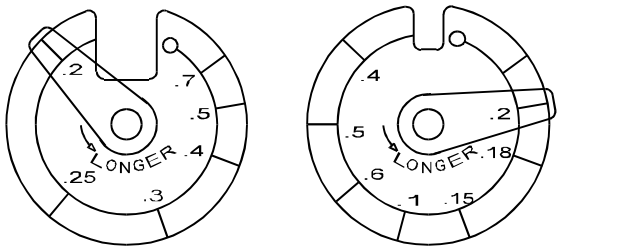
OIL LINE SAFETY VALVE (OSV)
An oil safety valve is recommended. This will only let fuel pass when the burner pump creates a partial vacuum. An OSV also prevents oil from flowing to the burner if there are any leaks in the oil line. Leaks in the system will prevent oil from flowing until they are repaired.

ELECTRICAL

ELECTRICAL CONNECTION
The NL4 furnace requires 120/240V 19.5A 60 Hz 1-Phase supply with 20 A time delay fuses, or 120/208V 21.0A 60 Hz 1-Phase supply with 25 A time delay fuses. Follow the Electrical Code as well as provincial, state, and local regulations. Figures 9, and 10 show standard wiring schematics. To shut down the burner at any time, turn the emergency or main power switch off.

THERMOSTAT
Locate the thermostat on an interior wall free from drafts approximately 5 feet above floor level. The operation of the burner is normally controlled by the room thermostat, which may be set for the temperature desired, typically 70°F. If a higher or lower temperature is desired, the indicator should be set to the proper point on the scale.

THERMOSTAT HEAT ANTICIPATOR
To prevent short cycling, the heat anticipator should be set as recommended in the specifications for the burner primary control. This is typically set at 0.2 amps as indicated in Figure 1. This adjustment changes the thermostat's response time to prevent the room temperature from over-running the thermostat setting.



HONEYWELL T822 WHITE RODGERS 1F30

FIGURE 1 - THERMOSTAT HEAT ANTICIPATOR SETTING

WARNING: The heat anticipator will BURN OUT if 25 volts are applied directly to the thermostat by shorting out the primary control during testing or incorrect wiring. If this happens the thermostat warranty is void.

FAN & LIMIT CONTROL
This thermally operated control has a probe to sense air temperature adjacent to the heat exchanger. Figure 3 shows the dial of the Honeywell L4064 Fan & Limit Control. Refer to Figure 2 for its settings. For controls equipped with the white Manual-Auto switch button, constant fan operation can be achieved by pushing the white button to the "MAN" position.

(HIGH) LIMIT Setting: This setting shuts off the burner if the furnace outlet air temperature reaches that setting. The temperature has to fall below the limit setting before burner power is restored. The power to the circulating fan (blower) is not affected by this part of the control.

FAN ON Setting: The burner starts on the call for heat from the thermostat. The circulating fan starts when the air temperature in the furnace reaches the “fan on” setting. This sequence ensures that only warm air is circulated

FAN OFF Setting: When the thermostat is satisfied and the burner shuts off, the circulating fan (blower) runs until the furnace has cooled off to this setting. This ensures that the blower adequately cools the heat exchanger before shutting off and keeps cooler air from being circulated through the ductwork.

Note: The minimum differential between the Fan On & Fan Off settings is 15°F (8 ^{o} C).

FAN ON	FAN OFF	LIMIT
125	90	200

FIGURE 2 - RECOMMENDED FAN & LIMIT SETTINGS

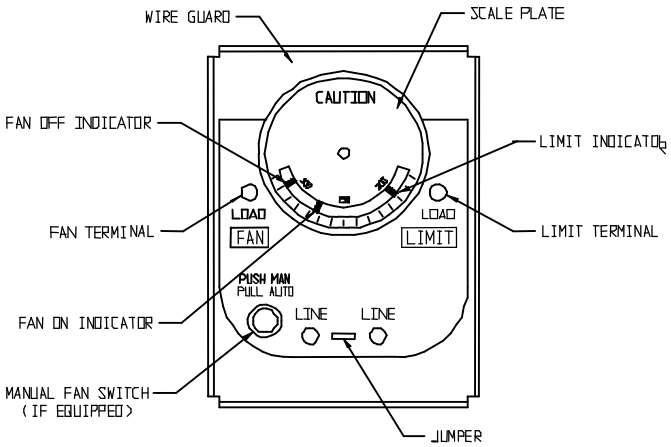


FIGURE 3 - HONEYWELL L4064 FAN & LIMIT CONTROL

COMBUSTION AND VENTILATION AIR

A free flow of air for combustion and ventilation must be permanently provided to the furnace room.

COMBUSTION AIR
Combustion Air refers to the total outside air requirement required for the fuel combustion and exhaust venting of the fuel-burning appliance. This includes air for the burning the oil and air to provide chimney draft (dilution air) through the barometric draft regulator. It is provided through opening or ducts.

VENTILATION AIR
Ventilation air from is provided to keep the ambient air temperature around the furnace within safe limits under normal conditions. Provision should be made for free circulation of air inside the room where the appliance is located.

CONFINED LOCATION
A confined location is a furnace room that is too small to permit dissipation of the heat from the furnace casing. The installation code definition of a confined location is one that has less than 50 cubic feet of space per 1,000 Btu/h of input to the appliances located in that space. Ventilation in the form of wall openings or ducts must be provided to a confined location. If the furnace room has a volume greater than 50 cubic feet of space per 1,000 Btu/h of input, no provision for ventilation is necessary as the room is considered capable of absorbing and dissipating heat lost from the furnace casing without overheating the furnace room.

Furnaces installed in tight buildings, in buildings with unbalanced air exhaust systems, or in enclosed spaces, are very likely to have complaints of smoke, fumes, burner lockouts, and excessive fuel consumption. This is more likely in buildings constructed after 1985 due to the tighter building construction prescribed by the 1985 building codes. Regulations are specific on the minimum allowable quantities of ventilation and combustion air required. However, every building is subject to different internal and external conditions, and regulations vary among localities. Newmac requires provision for combustion and ventilation air as specified in Table 3, which is based on an analysis of relevant codes and regulations.

Values indicated in Table 3 are based on the maximum input rating. However, in making combustion and ventilation analysis the aggregate input rating of all appliances in the space must be considered. The installation of additional oil-fired appliances may require more combustion and ventilation air. Allowances must also be made for the blocking effect of louvers, grilles and screens. If the design and free area is unknown, assume wood louvers have 20-25% free area and metal louvers and grilles have 60-75% free area. Screens should not be less than 1/4 inch mesh.

TABLE 3 - COMBUSTION & VENTILATION AIR OPENING AND DUCT SIZING FOR NL4 MAXIMUM INPUT 378,000 BTUH

Furnace room floor area (assuming 8' height) Confined is less than 50 cu ft per 1,000 Btuh of input	Outside combustion Air – minimum free-flow area 1 sq in per 5,000 Btuh of input	Furnace room ventilation openings – minimum free flow area			
		For an opening requiring 1 sq in per 1,000 Btuh of input	For an opening requiring 1 sq in per 2,000 Btuh of input	For an opening requiring 1 sq in per 4,000 Btuh of input	For an opening requiring 1 sq in per 5,000 Btuh of input
More than 945 sq ft – unconfined	76 sq in	Not required	Not required	Not required	Not required
Less than 945 sq ft - confined	76 sq in*	378 sq in	189 sq in	95 sq in	76 sq in
Nearest Size – Square	9" x 9"	22" x 22"	14" x 14"	10" x 10"	9" x 9"
Nearest Size – Round	10" Diameter	20" Diameter	16" Diameter	11" Diameter	10" Diameter

*The combustion air makeup must be from outside for all appliances.
If the furnace room ventilation ducts are open to the outside, separate combustion air ducts are not required because the combustion air will be taken from the ventilation air ducts.

EXPLANATION OF TABLE 3

- The table is based on the furnace input for the highest nozzle rate of 378,000 Btuh. The areas can be reduced proportionately for lesser inputs.
- The left hand column *Furnace Room Floor Area* of 945 sq ft is the minimum floor area for a furnace room with a height of 8 ft for an *unconfined* installation. So an 8 ft high furnace room of more than 945 sq ft floor area is *unconfined*.
- The center column *Outside Combustion Air – Flow Area* shows the free flow area required for combustion air for the input of 378,000 Btu/h.
- The right hand columns *Furnace room ventilation openings – flow area* show the flow areas required for ventilation of a confined furnace room. The installation codes require minimum flow areas based on 1 square inch per 1,000 2,000, 4,000 and 5,000 Btu/h of input, depending on ventilation duct orientation. These areas are shown for the maximum 378,000 Btu/h NL4 input as 378, 189, 95 and 76 sq ins.
- If the furnace is operating at an input of 378,000 Btu/h in an unconfined furnace room, it requires outside combustion air through an opening or duct of 76 sq ins free flow area. It does not require ventilation.
- If the furnace is operating at an input of 378,000 Btu/h in a confined furnace room, it requires outside combustion air through an opening or duct of at least 76 sq ins free flow area, and ventilation of the furnace

room through additional openings or ducts either into adjacent spaces or to the outside. The codes describe give the ventilation options.

The following should be kept in mind when using Table 3:

- All applicable codes and regulations must be followed. These give detailed requirements for combustion and ventilation air.
- Check the installation code to establish which ventilation rate should be applied for your duct size and orientation
- All furnaces require outside combustion air to make up for the air they consume through the burner and the barometric draft control.
- A furnace installed in an unconfined furnace room does not require specific provision for ventilation to keep it cool.
- For ventilating a confined space, two openings are generally required, one near the ceiling and one near the floor of the confined space.

- Maximum length of run for a duct with the same free flow area as the opening shown is 50 ft. Duct sizes should be increased for longer runs.
- Ducts carrying outside air should be designed or insulated to prevent condensation on their outer surface. A minimum insulation value of R-3 is recommended.
- If a grille, louver, or mesh is installed in an opening, the overall grille size must be increased so that the free flow area is maintained. The free flow area is the total amount of actual area available for the air to flow through.

Ducted outside combustion air should be brought as close to the appliance as possible. The furnace is not approved for direct connection of outside combustion air to the burner, as this would defeat the operation of the barometric draft control. If a means of closing the combustion air openings is required when the appliance is not operating, such means should be interlocked with the burner to avoid unsafe operation.

Guidelines to determine the need for additional combustion and ventilation air may not be adequate for every situation. If in doubt, it is advisable to err on the safe side and provide additional air.

AIR CONDITIONING

This appliance can accommodate air conditioning equipment. An air conditioning relay can be mounted on the furnace junction box located on the front panel. The furnace input is restricted when providing the additional static pressure for the air conditioning coil. See Table 1 - General Instructions and Table 2 - Blower Settings at the start of this manual.

HUMIDIFIER

If a humidifier is installed, ensure water cannot drip on the heat exchanger. This will damage the furnace and void the warranty.

OIL BURNER INSTRUCTIONS

BURNER CARE

The burner is fully automatic in operation. A qualified technician should make all adjustments. Keep the burner free from excess dirt and moisture. Oil leaks should be tended to immediately. No lubrication is required.

OIL PUMPS AND FUEL SYSTEMS

Make sure the by-pass plug is correctly located for a one or two pipe system. Failure to do so may damage the pump. Generally, for 3/8” copper tubing the vertical lift should not exceed 8 feet and the horizontal run should be limited to 30 feet. Do not exceed 10 psi oil inlet line pressure to the pump.

Single pipe systems are recommended for gravity feed or when the tank outlet is at a higher elevation than the pump inlet. Refer to Figure 7. The inlet vacuum, if the pump is lifting the oil, should be no more than 6" Hg.

Two pipe systems are recommended for lift feed or when the pump inlet is at a higher elevation than the tank outlet. Install the return line termination inside the tank higher than the supply intake as shown in Figure 7. Generally, the inlet vacuum to the oil pump should be no more than 12" Hg.

Correct piping is critical to long-term operation of the fuel system. Never use compression fittings, as they may not reliably seal. Minimize the resistance to flow due to excessive line lengths; high lift; and unnecessary fittings, kinks and bends. This will decrease the running vacuum and the risk of air separation within the fuel line. A "Tigerloop" fuel oil de-aerator may improve the performance of poorly designed fuel oil delivery systems.

The information presented here is intended as a guide only. For piping system design data, consult the installation instructions from the pump manufacturer.

CAUTION: Do not use gasoline, crankcase or any oil containing gasoline. Do not tamper with the furnace or controls - call the serviceman. Do not attempt to start the burner when excess oil has accumulated, when the furnace is full of vapor or when the combustion chamber is very hot. Do not start the burner unless the cleanout doors are secured in place. Do not burn garbage or paper in the heating system. Never leave combustible materials such as paper or rags near the furnace.

OIL BURNER INSTALLATION

- Install the oil nozzle in the burner firing assembly, and check the adjustments.
- Figure 4 and Table 4 show the correct electrode settings. These settings are important for proper burner operation.
- Some burner manufacturers provide a gauge available for setting the electrodes.
- Most burners with adjustable heads have preset stops to ensure the distance from the nozzle face to the face of the retention head ("Z" dimension) is correct.
- Set or check the air tube insertion depth according to Figure 6 and Table 4. This is the distance from the face of the mounting flange to the face of the retention head.
- Mount the oil burner on the studs of the burner plate, carefully centering it in the combustion chamber opening. Use TABLE 1 - GENERAL INSTRUCTIONS for preliminary air settings for the burner.

INSTRUMENTS

The installer must use a suitable draft gauge, smoke spot tester, carbon dioxide tester, 0-750°F stack thermometer, 0-200psi oil pressure gauge, 0-30 in. Hg. vacuum gauge, and 0-220°F thermometer to set-up the burner properly.

OIL BURNER SET-UP

1. Turn on supply power and set the thermostat above room temperature.
2. Open all oil lines and valves.
3. Make sure the oil pump by-pass plug is correctly located for a one or two pipe system. Bleed the oil pump (refer to pump manufacturer's instructions).
4. Adjust the burner air until a #1 smoke is reached using a smoke tester. Increase the air until the CO_2 level in the stack gas reduces by at least 1% below that at the #1 smoke.
5. If the burner furnace fails to start, check: (a) oil supply; (b) ignition electrodes and transformer; (c) cad cell.
6. If the burner goes off on safety, do not push the reset button on the primary control for at least 10 minutes. ***Do not push the reset button more than once before correcting the cause.*** If the burner still does not start, press the reset on the burner motor.
7. Using a suitable draft meter, adjust the barometric draft regulator to measure the specified flue pressure when the chimney is warm. This requires that a 5/16" diameter sampling hole be made between the flue collar and the draft regulator.

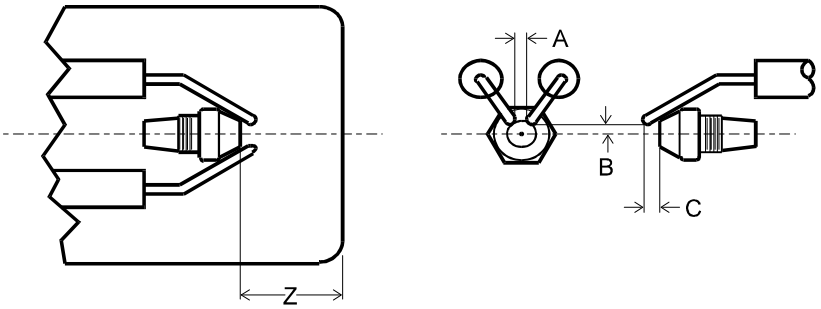


FIGURE 4 - ELECTRODE SETTINGS

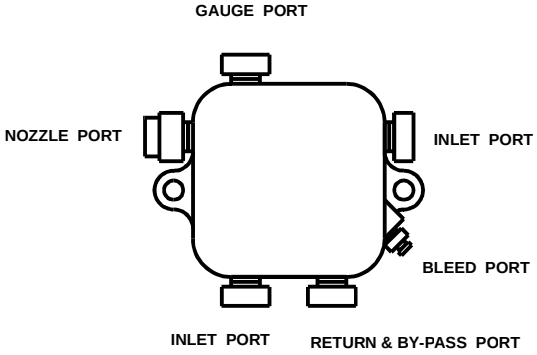


FIGURE 5 - TYPICAL OIL PUMP PUMP

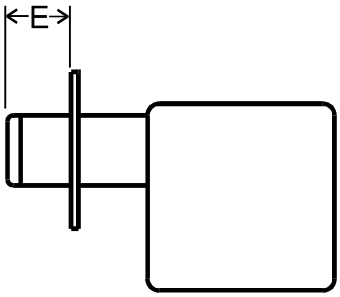


FIGURE 6 - BURNER INSERTION

TABLE 4 - ELECTRODE AND INSERTION DIMENSIONS (See Figures 4 and 6)

	Riello 40F10	Beckett AFG-AF104XPSS	Aero HF-US-4	Carlin EZ-3
A	5/32”	5/32"	1/8”	1/8" to 5/32"
B	13/64”	7/16"	7/16”	5/16"
C	5/32 to 7/32”	1/16"	1/16”	flush to 1/16"
Z	See Turbulator Setting	1-1/8"	1-1/8”	See head bar setting
E	9-1/2"TF (9-3/8” to gasket)	9-1/2"TF (to flange)	9-1/2”TF (to flange)	9-1/2"TF (to flange)

MAINTENANCE & SERVICE

Newmac requires the installer to fill out the INSTALLER INFORMATION sheet found at the end of this manual.

Maintenance and servicing must be done by a qualified burner technician or shortened furnace life and poor efficiency may result. CSA B139 requires that the furnace be inspected and maintained in a safe operating condition at least annually.

The heat exchanger should be inspected annually. If cleaning is required, remove the cleanout covers taking care not to damage the combustion chamber or gaskets. Use a wire brush (available from Newmac) to loosen scale and soot, and a vacuum cleaner to remove them from the furnace. Replace gaskets if necessary before replacing the cleanout covers. A layer of soot on the heat exchanger surfaces will reduce heat transfer efficiency and can increase fuel consumption. A 1/32" layer of soot acts as an insulator and can result in a 3% increase in oil burned. A 1/16" layer may result in a fuel loss of up to 8%.

PRESSURE CHECK

Install the pressure gauge directly on the gauge or nozzle port on the oil pump. Adjust to the pressure specified by Newmac for the nozzle input rating. Refer to TABLE 1, GENERAL INSTRUCTIONS in this manual or the certification label on the furnace.

Each oil burner should have its own suction line. A common return line can be used as long as the diameter is large enough. Check valves are not required on properly installed systems. Service on the fuel pump should not be attempted without a suitable vacuum and pressure gage.

OIL FILTER

The oil filter should be cleaned or replaced at least once a year by the serviceperson. Use a spin-on 10 micron or better filter. Newmac recommends General Filters Model GF-CGF10 (refill GF-K10GF) or Garber Model 11BV-R.

SEASONAL OR EXTENDED SHUT DOWN PERIODS

When the burner is not to be used for an extended period of time, set the thermostat at its lowest value, turn off the main switch and close the burner oil supply valve. If the furnace room is damp, protect the burner against dirt and moisture with a light cover. To resume operation, remove the cover and inspect the burner. Remove any dirt and debris gently to avoid the need to adjust the air band. Open the supply valve and turn on the main switch. If the burner fails to operate see the MAINTENANCE & SERVICE section of this manual.

COMBUSTION CHAMBER

Make sure the combustion chamber was not damaged or misaligned during shipping. Inspect the combustion chamber periodically for damage and replace if necessary.

AIR FILTERS

Air filters should be inspected monthly and changed as required. At least two changes are usually required during the heating season - more may be necessary if dusty conditions exist. Remove the filter gently to prevent dust spillage. Install filters of the same size and type. When installing, check filter arrows to make sure that the airflow is passing through the filters in the correct direction.

BLOWER MOTOR

Motor manufacturers generally supply motors that do not require oiling. Oil ports usually have plastic covers and are found on the motor end caps. If oil ports are not incorporated, oiling is not required. For motors with provision for re-oiling use SAE 20 non-detergent oil or oil specially formulated for electric motors. Use only a few drops two or three times a year.

BLOWER REMOVAL

- Disconnect power to the furnace before removing or servicing the blower.
- Remove the blower access panel on the rear of the furnace.

- Remove the air filters and the rear filter support rails.
- If required, remove the belt and blower motor first. The wiring harness has sufficient length that the blower assembly can be removed without removing the blower motor or disconnecting the motor leads.
- Undo the four bolts securing the blower legs to the furnace floor.
- Slide the blower out toward the rear of the furnace.

BLOWER ADJUSTMENT

Do not start the burner unless the blower access door is secured in place

GENERAL

Depending on the oil input rate, this furnace is designed for a maximum air temperature rise through the furnace of 85^{o}F at a maximum external static pressure of 0.50 inches of water column (ins wc). However due to the wide range of static pressures in duct systems, it is the responsibility of the installer to verify that the temperature rise does not exceed 85^{o} F. See Tables 1 and 2.

To measure the actual temperature rise let the furnace operate for at least five minutes. Insert a thermometer and note the temperature of the warm air supply outlet at a point at least 24 inches downstream from the plenum. Next measure the temperature at the return air plenum. The difference between these two temperatures is the rise. Increasing the blower speed, lowering the firing rate, or increasing an undersized supply and return air ductwork flow area can reduce air temperature rise. When adjusting the blower motor pulley, ensure that the current rating for the blower motor is not exceeded.

The furnace life will be decreased and improper operation may result if insufficient air quantity passes over the heat exchanger. Similarly, too much air during heating mode resulting in a temperature rise of less than 65^{o} F may cause heat exchanger degradation due to internal condensation.

ADJUSTMENT

The number of turns open (TO) set on the motor pulley changes the blower speed and thus the air delivery rate (CFM) and air temperature rise. Closing the pulley (reducing the number of turns open) increases blower speed and decreases temperature rise. Opening the pulley (increasing the number of turns open) decreases the blower speed and increases the temperature rise. Do not set the motor pulley at less than 2 turns open as the current rating for the motor may be exceeded.

The 8 inch diameter blower pulley is required for all applications from 0.25 to 0.5 ins wc static pressure. Correct belt tension allows a 1 inch deflection midway between the pulleys. Too much tension may overload the motor - too little will cause belt slippage. Always use B type belts. When adjusting the blower motor pulley, ensure that the current rating for the blower motor is not exceeded.

Recommended pulley setting combinations vary according to the fuel input and static pressure drop through the furnace and duct system. Recommended pulley combinations for heating mode are given in TABLE 1, GENERAL INSTRUCTIONS and in TABLE 2, BLOWER PERFORMANCE for airflow data.

WARRANTY

The following information is required to process warranty claims:

- Owner's name and address;
- Furnace serial number;
- Furnace model number;
- Furnace installation date;
- Installer name, address and phone number.

Newmac must issue a "Returned Goods Number" prior to acceptance of returned goods. Refer to your LIMITED LIFETIME WARRANTY for terms and conditions.

Send the complete warranty information to Newmac head office by email, mail, or fax.

IMPORTANT HOMEOWNER INSTRUCTIONS

1. AN EMERGENCY POWER SWITCH IS REQUIRED TO BE INSTALLED IN A CONVENIENT LOCATION AT A SAFE DISTANCE FROM THE BURNER. THIS SWITCH INTERRUPTS THE ELECTRICAL SUPPLY CIRCUIT TO THE APPLIANCE. MAKE SURE YOU ARE AWARE OF ITS LOCATION AND THE OFF POSITION IS CLEARLY MARKED.

2. KEEP THE SPACE CLEAR AROUND THE APPLIANCE WITHIN THE SPECIFIED CLEARANCES TO COMBUSTIBLES.

3. ENSURE THE SUPPLY OF COMBUSTION AIR TO THE APPLIANCE IS NOT OBSTRUCTED OR CUT-OFF.

4. MAINTAIN PROPER VENTILATION OF THE APPLIANCE AREA.

5. MAINTAIN FREE AIR FLOW THROUGH THE RETURN AIR REGISTERS. *

6. CONTACT SERVICE PERSONNEL BEFORE REMODELLING.

7. CONTACT SERVICE PERSONNEL FOR ANNUAL SERVICE AND MAINTENANCE.

8. CONTACT SERVICE PERSONNEL FOR AIR FILTER REPLACEMENT. *

9. CONTACT SERVICE PERSONNEL BEFORE AND AFTER EXTENDED PERIODS OF APPLIANCE INOPERATION.

10. THE BURNER IS FULLY AUTOMATIC IN OPERATION. ALL ADJUSTMENTS SHOULD BE MADE BY A QUALIFIED TECHNICIAN. DO NOT PUSH THE RESET BUTTON MORE THAN ONCE.

    CAUTION : DO NOT ATTEMPT TO START THE BURNER WHEN EXCESS OIL HAS ACCUMULATED, WHEN THE APPLIANCE IS FULL OF VAPOUR, OR WHEN THE COMBUSTION CHAMBER IS VERY HOT.

11. **CAUTION : DO NOT TAMPER WITH THE APPLIANCE OR CONTROLS—CALL YOUR SERVICE PERSONNEL.**

12. **DO NOT USE GASOLINE, CRANKCASE OIL, OR ANY OIL CONTAINING GASOLINE**

13. ALWAYS KEEP THE OIL SUPPLY VALVE SHUT OFF IF THE BURNER IS SHUT DOWN FOR AN EXTENDED PERIOD OF TIME.

14. DO NOT START THE BURNER UNLESS THE BLOWER ACCESS DOOR IS SECURED IN PLACE.

15. NEVER BURN GARBAGE OR PAPER IN THE HEATING SYSTEM, AND NEVER LEAVE PAPER OR RAGS AROUND THE APPLIANCE.

* FURNACES ONLY

NL4 - REPLACEMENT PARTS LIST

NO.	PART NO.	DESCRIPTION	NO.	PART NO.	DESCRIPTION
	2020023	1-1/2 HP BELT DRIVE MOTOR (240V)		2040112	DELHI G15-10 BLOWER WITH LEGS
	2180004	24 X 16" FILTER		4050218	DELHI G15-10 BLOWER ASSEMBLY
	2010023	HONEYWELL L4064B2640B (5") FAN/LIMIT		4120245	FRONT PANEL
		WHITE RODGERS 5D51-334 (5") FAN/LIMIT		4120244	CENTER PANEL
	2040022	BAROMETRIC DRAFT REGULATOR 7"		4120255	TOP PANEL
	2200009	110" BLOWER WIRE HARNESS		4120246	REAR PANEL
	2080029	CLEANOUT COVER GASKET		4120243	BLOWER ACCESS DOOR
	2080098	GASKET FRONT		4120228	SIDE PANEL (LH)
	4120254	ELECTRICAL JUNCTION BOX		4120241	FAN PARTITION
	2200103	ELECTRICAL BOX COVER		4120250	REAR FILTER RACK
	2200106	ELEC BOX COVER 4X4 SWITCH 8361		4120251	TOP FILTER RACK
	2200271	SWITCH FOR ELECTRICAL BOX DPDT 20A		4120252	FILTER SUPPORT
	2010067	BLOWER POWER CONTACTOR		4120253	TOP RAIL
	2030020	NL4 COMBUSTION CHAMBER		4120242	CENTER PANEL FILLER
	4160145	SIDE CLEANOUT ASSEMBLY		4120227	BURNER PLATE
	4080133	FRONT CLEANOUT COVER		3090442	BURNER PLATE SHIELD
	4080124	FRONT CLEANOUT RETAINER		4110119	8" SMOKE COLLAR
				4120256	WIRE COVER
	2130031	CLEANOUT BRASS NUT 5/16"		4060178	HEAT EXCHANGER ASSEMBLY
	4120486G	SIDE CLEANOUT CASING COVER		4080108	8" SMOKE PIPE
	4100117	18" BURNER CABLE		2080100	SMOKE PIPE GASKET
	2110101	OIL BURNER AERO HF-US-4		4120229	SIDE PANEL (RH)
	2110053	OIL BURNER BECKETT AFG (NM901)		4120240	BASE PANEL
	2110026	OIL BURNER ONLY RIELLO 40F10		2240050	B49 FAN BELT
	2110179	OIL BURNER CARLIN EZ-3			
	2090054	10" BLAST TUBE ASSEMBLY RIELLO 40F10			B48 FAN BELT
	2010008	THERMOSTAT WR 1E30W-451S1		2240009	BLOWER PULLEY 8" X 1
	2010057	THERMOSTAT WHITE RODGERS IF30-349			
		PRIMARY RELAY HONEYWELL (BECKETT)		2010044	RIELLO SWITCHING RELAY R8038A
		PRIMARY RELAY HONEYWELL (AERO)			
	2010048	PRIMARY RELAY- 530E/C (RIELLO)			
		PRIMARY RELAY CARLIN			
	2010041	A/C FAN CENTRE HONEYWELL R8285A			
	2240008	VARIABLE SPEED PULLEY 3-1/2" X 5/8"			

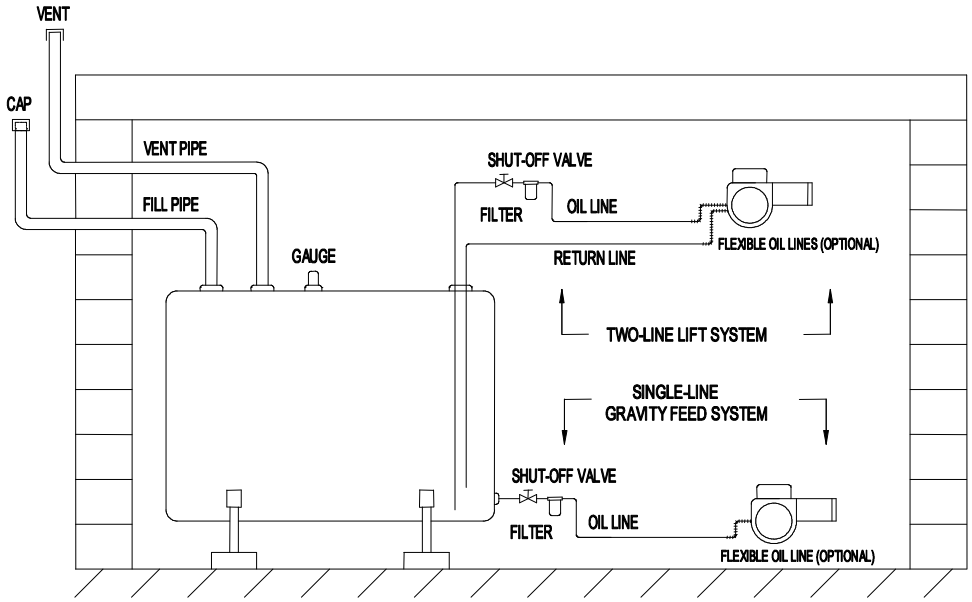


FIGURE 7 - TYPICAL OIL TANK PIPING INSTALLATIONS

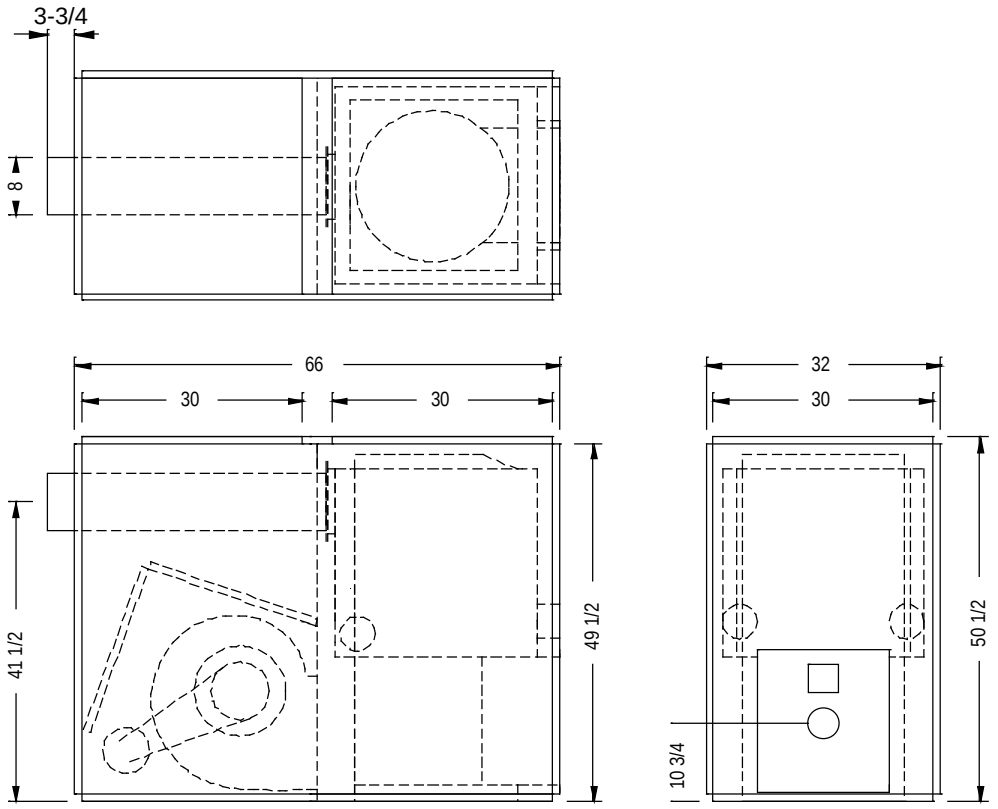


FIGURE 8 - NL4 FURNACE DIMENSIONS

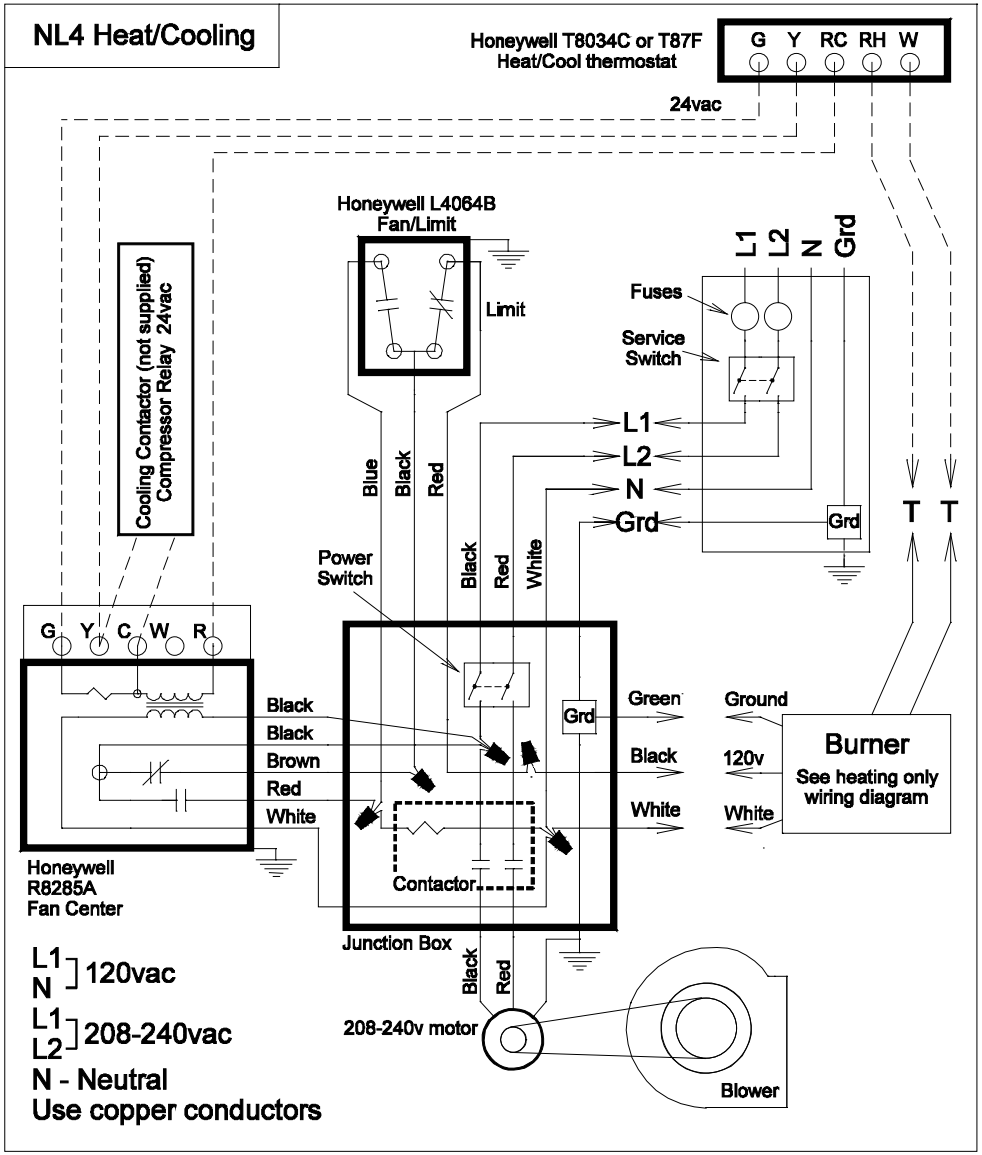


FIGURE 10 - WIRING DIAGRAM WITH FAN CENTRE

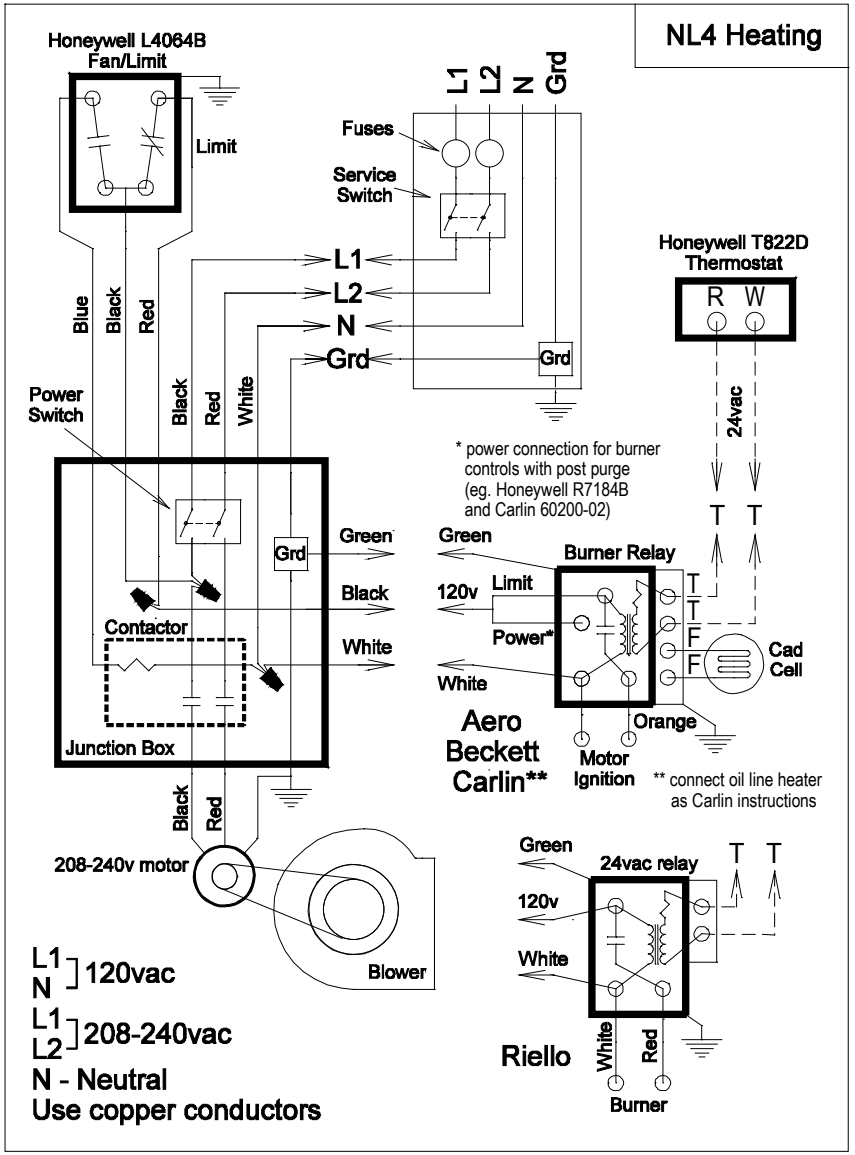


FIGURE 9 - WIRING DIAGRAM HEATING ONLY

TABLE 5 - TYPICAL DUCT SIZING FOR HEATING WITHOUT A/C COIL

OUTPUT CAPACITY (See Table 1)	Minimum Air Flow Required	Supply Duct or Extended Plenum @ 800 FPM	Min. Sq. Inch Needed for Spec. CFM (Total Area of All Supply Duct)	Min. Number Supply Runs @ 600 FPM			MINIMUM SIZE	
				6" RUNS 80 CFM	7" RUNS 155 CFM	3-1/2 X 14" 170 CFM	Return Duct Furnace or Air Handler @800 FPM	Return Air Grille (or equivalent) @ Face Velocity of 500 FPM
210,000 to 230,000	2,200 CFM	30" X 16"	440	20	14	14	30" X 16"	30" X 24"
250,000 to 300,000	2,800 CFM	30" X 20"	520	24	18	16	30" X 20"	30" X 30"
310,000 to 320,000	3,200 CFM	30" X 24"	720	28	20	20	30" X 24"	30" X 36"
330,000 to 340,000	3,600 CFM	30" X 28"	840	32	24	22	30" X 28"	30" X 42"
350,000 to 380,000	4,000 CFM	30" X 36"	960	36	26	24	30" X 36"	30" X 44"

TABLE 6 - TYPICAL DUCT SIZING FOR HEATING & COOLING WITH A/C COIL IN DUCT

Air conditioning systems should never be sized on the basis of floor area only, but knowledge of the approximate floor area (sq. ft.) that can be cooled with a ton of air conditioning will be of assistance in avoiding errors.

Size of OD Unit	Normal Air Flow Required @ 400 CFM per Ton	Furnace		Supply Duct or Extended Plenum @800 FPM	Min. Number Supply Runs @ 600 FPM			Minimum Return Air Duct Size at Furnace or Handler @ 800 FPM	Minimum Return Air Grille Size (or equivalent) @ Face Velocity of 500 FPM
		Blower Motor HP	Blower Wheel D x W		6" RUNS 80 CFM	7" RUNS 155 CFM	3-1/2" X 14" 170 CFM		
5 ton 30,000 BTUH	2,000	1-1/2	15" x 10"	20" x 20"	18	14	12	20" x 20"	30" x 24"
6 ton 72,000 BTUH	2,400	1-1/2	15" x 10"	24" x 20"	22	16	14	24" x 20"	30" x 24"
7 ton 84,000 BTUH	2,800	1-1/2	15" x 10"	24" x 24"	24	18	16	24" x 24"	30" x 30"
8 ton 96,000 BTUH	3,200		-	32" x 20"	28	22	20	32" x 20"	36" x 30"

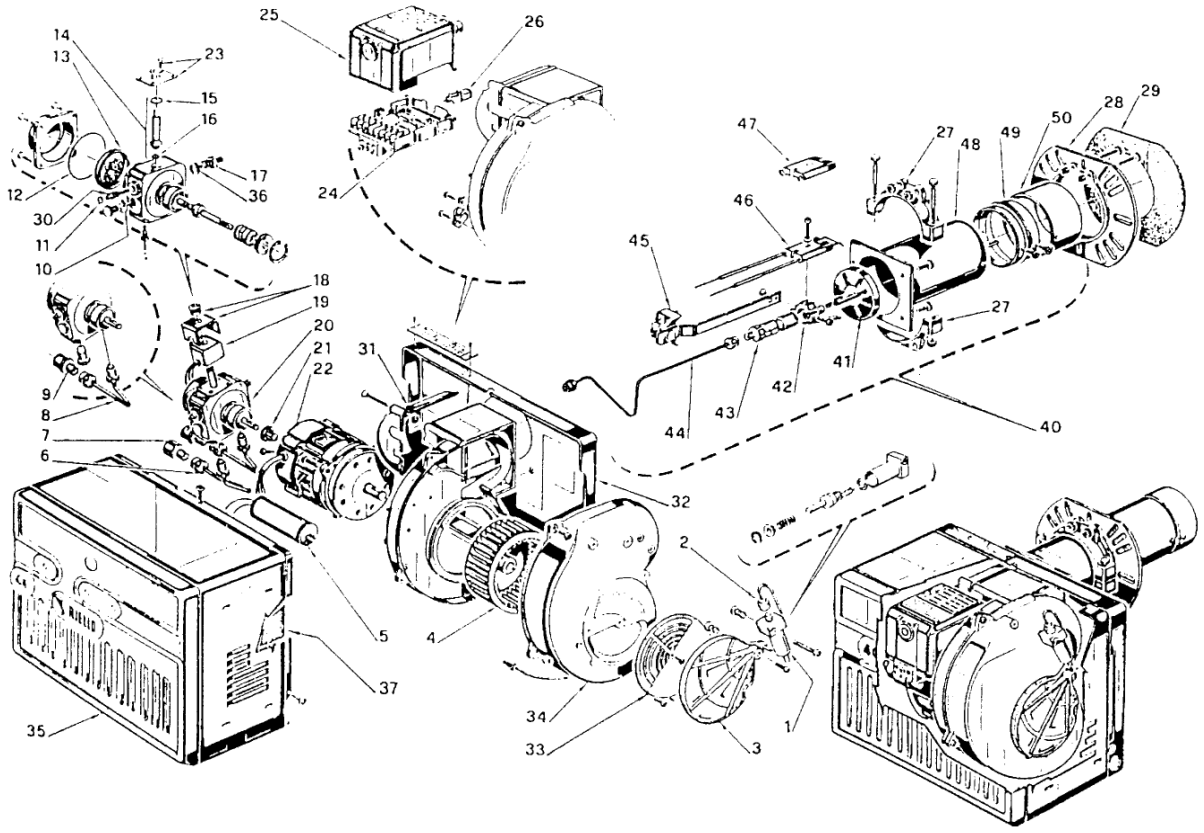


FIGURE 11 - RIELLO BURNER MODEL 40 F10 EXPLODED ASSEMBLY

No.	Spare Part Code	Newmac Number	Description	No.	Spare Part Code	Newmac Number	Description
1	3006911		Hydraulic Jack	31	3007317		Air Tube Cover Plate
2	3006913		Capillary Tube	32	3007223		Chassis Front Plate
3	3000879		Hydraulic Air Shutter	33	3007205		Manual Air Shutter
4	3005788		Fan	34	3007209		Air Intake Housing
5	3005844		Capacitor 5.7µF	35	3007234		Burner Back Cover
6	3006993		Pipe Connector – return	36	3007087		Crushable Metal Cover 5/8" ID.
7	3005847		¼" NPT/Metric Adapter – female	37	3007357		Acoustic Liner
8	3006992		Pipe Connector – Supply	5	3005798		Capacitor 4µF 450V
9	3006571		3/8" NPT/Metric Adapter – male	22			Motor 120V 60 Hz
10	3007077		Crushable Metal Washer – 3/8" ID.	40	3949071		Short Combustion Head 5" (273T1)
11	3007028		O-Ring - Pump Pressure Regulator	41	3006978		Turbulator Disc
12	C7010002		O-Ring Pump Cover	42	3006966		Electrode Support
13	3005719		Pump Screen	43	3006965		Nozzle Adaptor
14	3006925		Valve Stem	44	3006979		Nozzle Oil Tube – Short - 5"
15	3007029		O-Ring Valve Stem – Upper	45	3005888		Regulator Assembly – 5"
16	3007156		O-Ring Valve Stem - Lower	46	3005890		Electrode Assembly – 5"
17	3007268		Nozzle Outlet Fitting	47	3005869		Electrode Porcelain
18	3006553		Coil U-bracket and Retainer Nut	48	3006981		Air Tube – Short – 5"
19	3002279		Coil	49	3006983		End Cone Adaptor
20	3007802		Pump	50	3006984		End Cone
21	3000443		Pump Drive Key	40	3949072		Long Combustion Head – 10" (273T2)
22	3005843		Motor	41	3006978		Turbulator Disc
23	3007203		Plate – Valve Stem Retainer	42	3006966		Electrode Support
24	3002278		Primary Control Sub-base	43	3006965		Nozzle Adaptor
25	3001157		Primary Control 530SE/C	44	3006980		Nozzle Oil Tube – Long
26	3002280		Photo Cell	45	3005889		Regulator Assembly - Long
27	3005854		Semiflange (2 req'd)	46	3005891		Electrode Assembly – Long
28	3005855		Universal Mounting Flange	47	3005869		Electrode Porcelain
29	3005856		Mounting Gasket	48	3006982		Air Tube – Long
30	N/A		Regulator	49	3006983		End Cone Adaptor
				50	3006984		End Cone

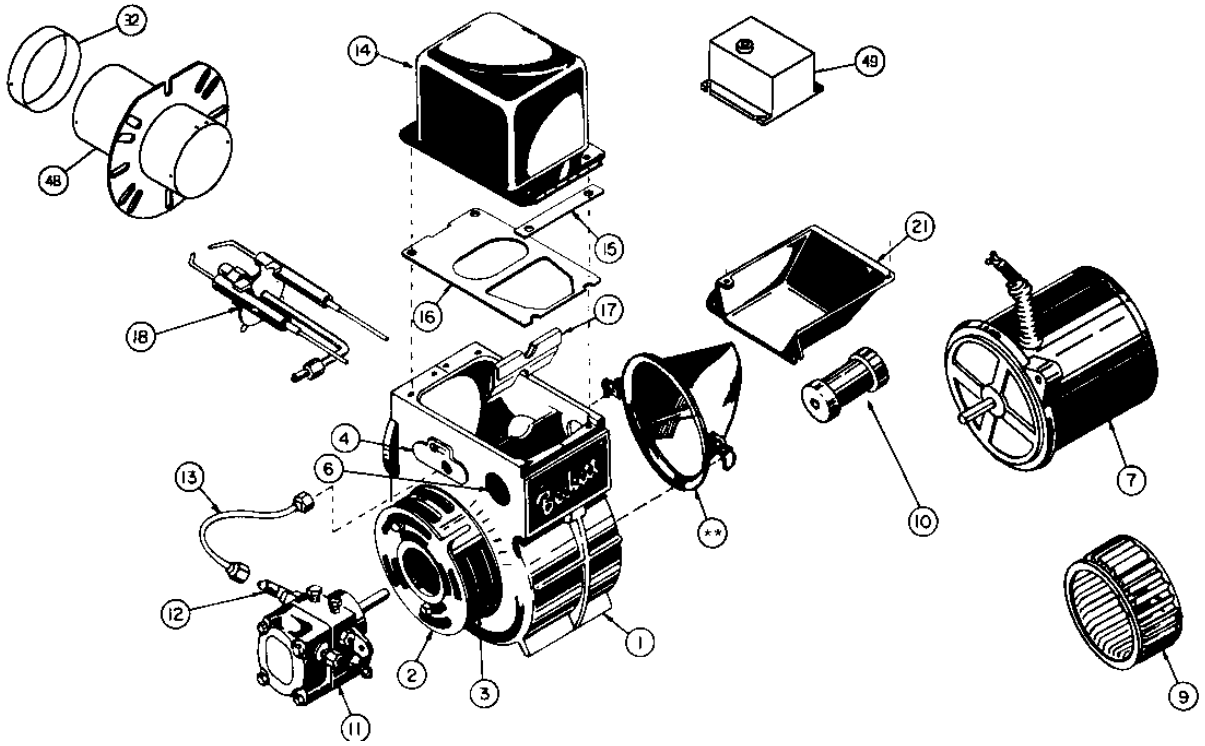


FIGURE 12 - BECKETT BURNER MODEL AFG

Item	Part number		Description
	Beckett	Newmac	
1	5874GY		Burner Housing Assembly
2	3709, 4198		Air Shutter, Retaining Screws
3	3492, 4198, 4150		Air Band, Screw, Nut
4	3493, 4187, 5941		Escutcheon Plate, Screw, Plate Assembly
	3616		Burner Mounting Gasket
6	2139		Hole Plug
7	21805U, 4189		Motor, Mounting Screws
9	2999		Blower Wheel
10	2454		Coupling
11	A2EA 6520, 4189		Fuel Unit, Mounting Screws
12	2256		Fuel Unit, Nozzle Port Fitting
13	5636		Connector Tube Assembly
14	51771U, 4217, 42922,		Ignition Transformer, Hinge Screws, Hold Screws
15	31232		Hinge To Housing Gasket
16	3502		Transformer Gasket
17	3708		Baffle (Not Used)
21	5770		Junction Box Kit
48			Air Tube Combination
49			Control Relay Honeywell R7184
			Cad Cell Honeywell C544A1687T
**			Factory Installed Air Guide - Do Not Remove From Burner

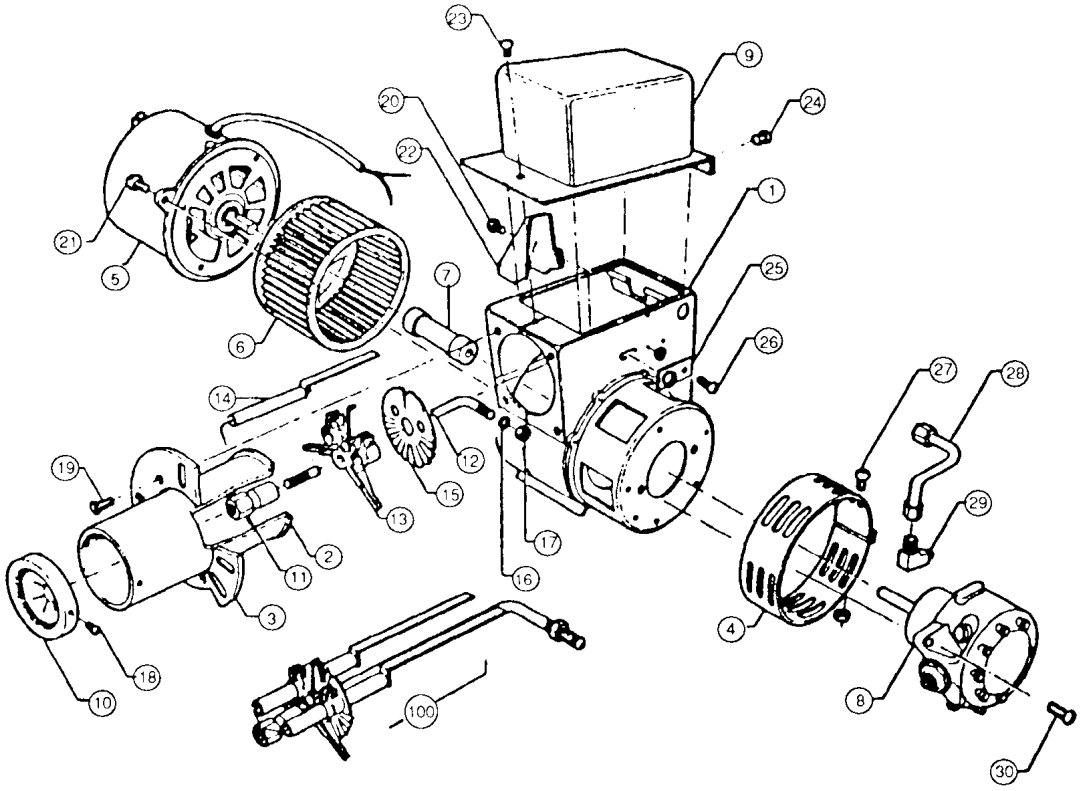


FIGURE 13 - AERO BURNER MODEL HF-US-4

ITEM	PART NUMBER		QUANTITY	DESCRIPTION
	AERO	NEWMAC		
1			1	HF-US Housing
2			1	Blast Tube , 11”
3			1	Mounting Flange – Fixed
			1	Flange Spacer
4			1	Air Band, 9 Hole
5			1	Motor 1/3HP, 3450 rpm
6			1	Fan, 508-229, HF-US
7			1	Coupling
8			1	Pump
9			1	Transformer, 2275-456
				Electronic Ignitor
10			1	End Cone, AFC-4
			2	End Cone Screws, Stainless Steel
12			1	Tube, Oil Delivery
19			4	Blast Tube Screw (Specify Length)
25			1	Slide Plate
26			1	Slide Plate Locking Screw
27			1	Air Band Locking Nut
28			1	Oil Line Assembly
33			1	Oil Burner Mounting Gasket
100			1	Electrode Assembly
			1	Primary Control, 30sec
			1	CAD Cell, Honeywell, C554A1455B

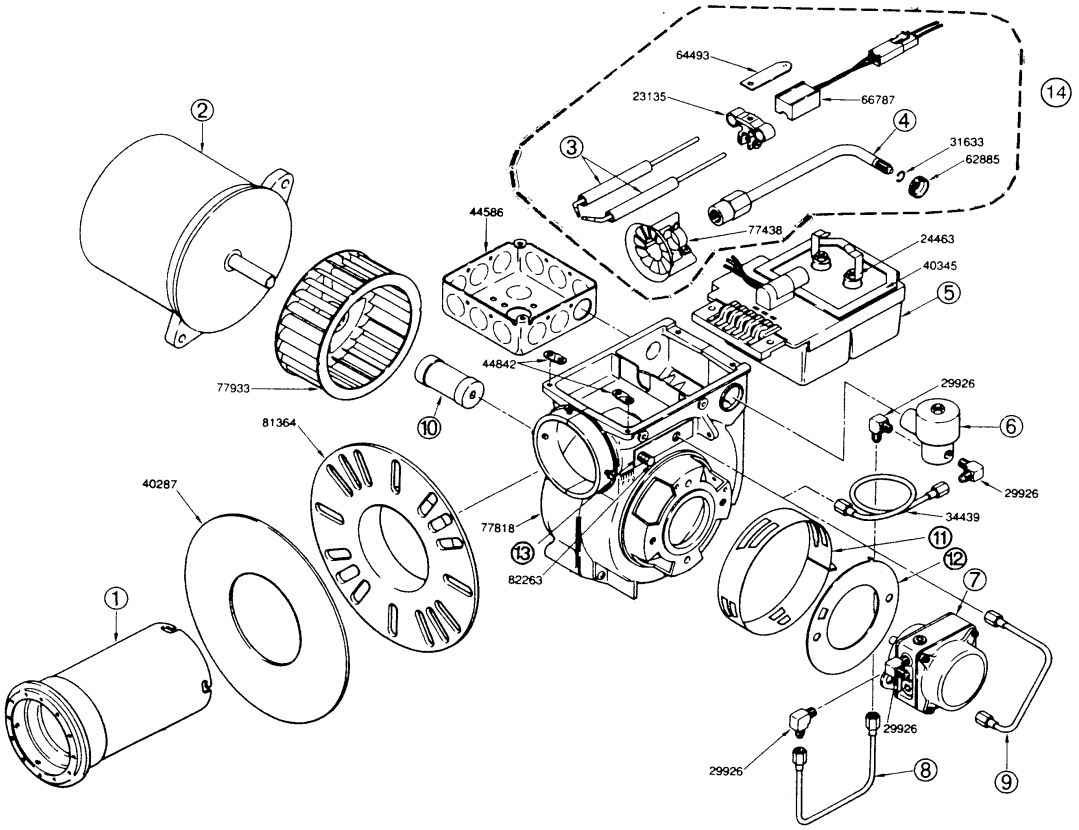
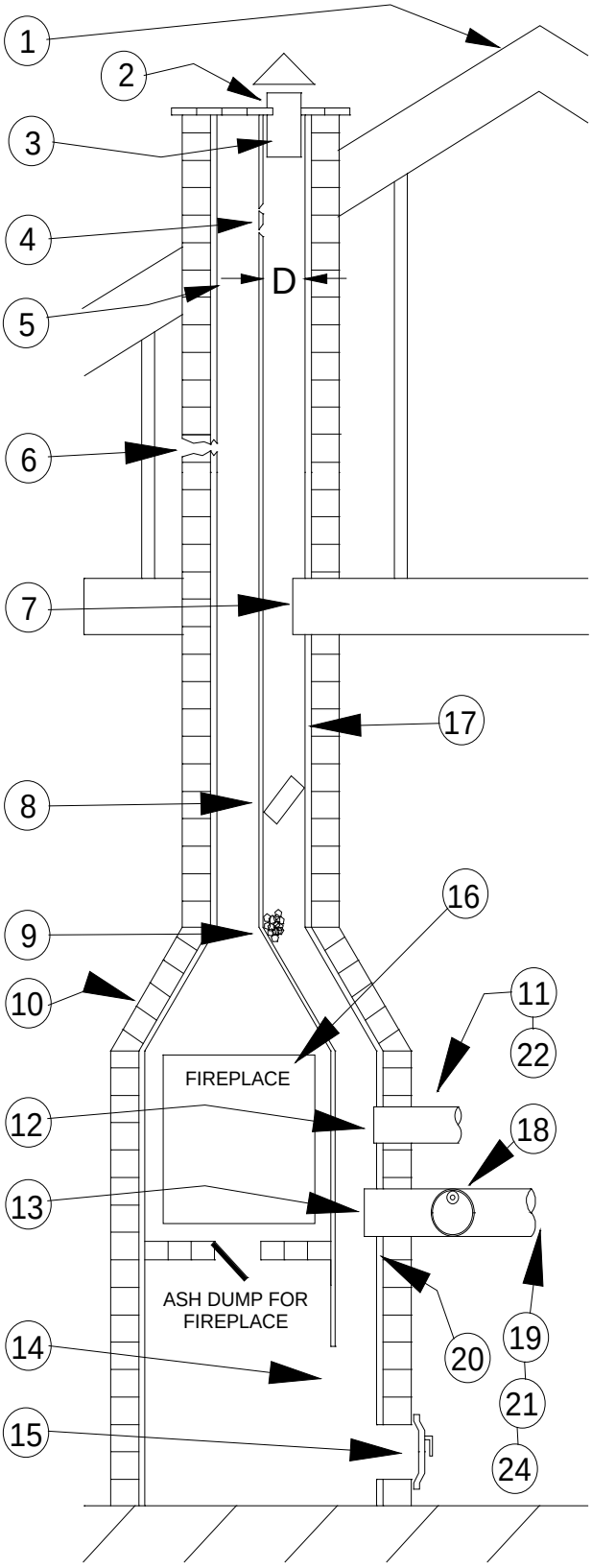


FIGURE 14 - CARLIN BURNER MODEL EZ-3

ITEM	PART NUMBER		QUANTITY	DESCRIPTION
	CARLIN	NEWMAC		
23135			1	Electrode Holding Base w/Hardware
24463			1	Transformer Terminal Kit (2 terminals & nuts)
29926			1	Elbow, 3/16 Flare x 1/8 NPT
31633			1	C-ring for Nozzle Line
34439			1	Oil Line, 3/16 OD, Oil Valve to Nozzle Line
40287			1	Gasket, Mounting Flange
40345			1	Gasket, Transformer
44586			1	Junction Box, 4" x 4", w/grommet and lockwasher
44842			1	Transformer hold-down tab - 2 req
62885			1	Thumb-Nut - Nozzle Line
64493			1	Bracket - Nozzle Line Heater
66787				Nozzle Line Heater w/electrical disconnect
77438			1	Flame Retention Ring Assembly
77818			2	Housing, w/84939 Access Cover
77933			1	Blower Wheel, 5/16D x 2W
82263			4	Thumb Screw, Head Positioning Bar
1	see Newmac		1	11" air tube assembly
2	98022		1	Motor, 1/7HP, 3450rpm
3	82792		1	Electrode wire - 11"
4	56754		1	Nozzle line adapter assembly, 11"
5	60200-02		1	Primary Control - Carlin (30-15-30)
6	40857		1	Oil Valve
7	22996		1	Fuel Unit, Suntec A2VA-7116, w/fitting
8	34397		1	Oil Line, 3/16OD, Fuel Unit to Valve
9	34470		1	Oil Line, 3/16OD, Fuel Unit to Nozzle Line
10	75564		1	Coupling for standard fuel units, approx 2-3/8" OAL:
11	86322		1	Air Band (EZ-3)
12	46946		1	Air Shutter, 4 slots (EZ-3)
13	See Newmac		1	Newmac Head Positioning Bar Kit
14	77942		1	Combustion Head Assembly, 11"

FIGURE 15 – COMMON CHIMNEY DRAFT PROBLEMS



	CAUSE	CORRECTION
1	ROOF PEAK, BUILDINGS OR TREES HIGHER THAN CHIMNEY	EXTEND CHIMNEY HEIGHT
2	COPING RESTRICTS OPENING	ENLARGE TO CHIMNEY FLUE INSIDE DIMENSIONS
3	CAP ASSEMBLY TOO SMALL FOR CHIMNEY FLUE	INSTALL LARGER CAP ASSEMBLY TO FIT
4	BREAKS IN CHIMNEY LINING	REPAIR OR REPLACE AND RESEAL
5	CHIMNEY FLUE TOO SMALL	CHECK TABLE 7 AND INSTALLATION CODE FOR MINIMUM DIAMETER D
6	CHIMNEY OUTSIDE WALL DAMAGED	REPAIR DAMAGE AND RESEAL
7	JOIST PROTRUDES INTO CHIMNEY STRUCTURE	REMOVE JOIST AND RESTORE TO CODE CLEARANCES TO COMBUSTIBLES
8	OBSTRUCTION INSIDE CHIMNEY FLUE	REMOVE OR KNOCK THE OBSTRUCTION DOWN AND REMOVE FROM LOWER CLEANOUT
9	SOOT ACCUMULATION AT OFFSET	REMOVE
10	OFFSET IS TOO SHORT	STRAIGHTEN OR LENGTHEN
11	TOO MANY APPLIANCE ON SAME FLUE	REMOVE OR RELOCATE APPLIANCES IN EXCESS OF FLUE CAPACITY
12	LOOSE SMOKE PIPE IN FLUE OPENING	SECURE AND SEAL
13	SMOKE PIPE EXTENDS INTO CHIMNEY FLUE	MAKE END FLUSH WITH INSIDE OF CHIMNEY FLUE
14	OPENING BETWEEN FLUES	PERMANENTLY SEAL OPENING
15	LOOSE FITTING CLEANOUT DOOR	CLOSE AND SEAL ALL LEAKS
16	OPEN FIREPLACE	SEAL OFF OPEN FIREPLACE
17	NEW MASONRY CHIMNEY	WAIT 2 - 4 WEEKS FOR STRUCTURE TO CURE
18	TOO MUCH OR TOO LITTLE DRAFT	ADJUST DRAFT REGULATOR
19	TOO MUCH DRAFT WITH REGULATOR FULLY OPEN	INSTALL LARGER OR ADDITIONAL DRAFT REGULATORS
20	SMOKE PIPE TOO CLOSE TO CHIMNEY BASE	RAISE SMOKE PIPE
21	WIDELY FLUCTUATING DRAFT AND DOWN DRAFTING	TRY DIFFERENT TYPE OF CHIMNEY CAP
22	UNUSED CHIMNEY CONNECTION	REMOVE AND/OR SEAL
23	HOUSE DE-PRESSURIZATION	PROVIDE ADDITIONAL COMBUSTION AIR TO APPLIANCE
24	FLUE PIPE TOO LONG OR TOO MANY ELBOWS	MINIMIZE FLUE PIPE TOTAL EQUIVALENT LENGTH

FIGURE 16 - TROUBLESHOOTING CHART

PROBLEM	CAUSE	CORRECTION
Burner Motor Fails to Start	Thermostat	Check for Broken Wires
		Tighten Connections
		Clean Contacts
		Replace Thermostat
	Burner Motor Overload Tripped	Press Rest Button
	Ceased Pump	Repair or Replace
	Faulty Primary Relay	Repair or Replace
Burner Start--No Flame	Oil Supply	Check Oil Supply
	Air Leak in Oil Supply Line	Tighten Fittings or Replace Line
	Oil Line Plugged or Kinked	Clean or Repair
	Oil Filter Clogged	Replace or Clean
	Loss of Prime	Eliminate Teed Oil Lines
	Electrode Setting	Adjust Electrodes
	Loose or Dirty Nozzle	Replace Nozzle
	Ignition Transformer	Replace Transformer
	Burner Motor Overload Trips	Press Rest Button
	Ceased Pump	Repair or Replace
	Faulty Primary Relay	Repair or Replace
Burner Locks out on Safety	Cad Cell	Clean or Replace
	Oil Line Restricted	Clear Restriction
	Plugged Fuel Pump	Clean Strainer
	Loss of Prime	Eliminate Teed Oil Lines
	Cold Oil	Change to #1 Oil
		Convert to One Line System
	Poor Combustion	Adjust Air Settings
		Ensure Draft is Adequate
Burner Ignition Delayed	Air Leak in Oil Supply Line	Tighten Fittings or Replace Line
	Loose or Dirty Nozzle	Replace Nozzle
	Faulty Oil Pump	Repair or Replace Pump
	Oil Supply Line	Ensure Properly Designed
	Loss of Prime	Eliminate Teed Oil Lines
	Electrode Setting	Adjust Electrodes
	Cracked Electrodes	Replace Electrodes
	Wrong Nozzle	Use Specified Nozzle
	Low Oil Pressure	Adjust to Correct Setting
	Excess Air	Adjust Air Setting
	Faulty Transformer	Replace Transformer
Fumes & Odors From Burner	Insufficient Combustion Air	Provide Combustion Air
	Inadequate Flue Draft	Provide Specified Draft
	Pump Seal Leaking	Repair Pump
	Loss of Prime	Eliminate Teed Oil Lines
	Nozzle Assembly Adjustment	Ensure Setting is Correct
	Burner Adjustment	Check Using Instruments
	Blast Tube Burned Off	Check Blast Tube
	End Cone Wrong or Burned Off	Check End Cone
	Incorrect Insertion	Measure Insertion Depth
	Dirty Burner Fan	Clean Blades
	Damaged Chamber	Check Chamber
	Clogged Flue Passages	Clean Flue Passages
	Nozzle After Drip	Check Fuel Delivery System
	Unspecified Nozzle	Replace Nozzle

FIGURE 16 – TROUBLESHOOTING CHART – CONTINUED

PROBLEM	CAUSE	CORRECTION
Not Enough Heat	Firing Rate Too Low	Use Higher Input Nozzle
	Dirty Heat Exchanger	Clean Heat Exchanger
	Poor Combustion	Adjust Using Instruments
	Undersized Capacity	Sized Based on Heat Loss
	Distribution System	Proper Duct Design
	Faulty Thermostat or Location	Repair, Replace, or Relocate
Too Much Heat	Defective Primary Control	Repair or Replace
	Faulty Thermostat or Location	Repair, Replace, or Relocate
	Faulty Oil Pump	Check for Proper Pressure
	Firing Rate Too High	Reduced Nozzle Size
	Oversized Capacity	Size Based on Heat Loss
	Distribution System	Proper Duct Design
Excessive Oil Consumption	Poor Combustion	Adjust Using Instruments
	Excess Air	Adjust Air Setting
	Inadequate Flue Draft	Provide Specified Draft
	Insufficient Combustion Air	Provide Combustion Air
	Oil Supply	Check Oil Supply
	Electrode Setting	Adjust Electrodes
	Wrong Nozzle	Use Specified Nozzle
	Fuel System Leaking	Check Fuel System
	Faulty Oil Pump	Repair or Replace Pump
Short Cycling	Over-Firing	Use Specified Nozzle Size
	Tripping High Limit	Replace Dirty Filters
		Increase Blower Speed
		Increase Undersized R/A ducts
		Clear Blocked Return Registers
		Increase Undersized S/A Ducts
		Clear Blocked Supply Grilles
		Replace Faulty Blower Motor
		Clean Clogged Blower Wheel
		Replace Broken Blower Belt
	Faulty Thermostat or Location	Repair, Replace, or Relocate
	Heat Anticipator Set Too Low	Adjust Heat Anticipator
	Defective Primary Relay	Repair or Replace Relay
Noise	Burner Pump Whine	Eliminate Suction Air Leak
	Duct Expansion	Stiffen Plenum and Ducts
	Plenum Amplifies Noise	Install Plenum Apron
Burner Air Tube Burn-Off	Blocked Flue Passages	Clean Boiler
	Unspecified Burner	Replace Burner
	Unspecified Nozzle	Install Correct Nozzle
	Incorrect Head	Install Correct Head
	Wrong/Misaligned Static Plate	Install Correct Plate or Align
	Chimney Down Drafting	Install Chimney Cap
	Poor Over-Fire Draft	Increase Draft at Breech
		Correct Chimney Problems
	Over-firing	Use Specified Nozzle
		Use Specified Pressure
	Incorrect Insertion	Use Correct Air Tube Assembly
		Adjust Flange
Frequent Sooting	Reduced Draft	Add Combustion Air
	Delayed Ignition	Adjust Burner Settings
	Loss of Prime	Eliminate Teed Oil Lines
	Unspecified Burner	Replace Burner
	Unspecified Nozzle	Install Correct Nozzle
	Incorrect Head	Install Correct Head
Premature Corrosion	Temperature Rise Too Low	Reduce Motor Speed
		Use Higher Specified Nozzle

INSTALLER INFORMATION

NAME
COMPANY
INSTALLATION DATE
THE HOMEOWNER SHOULD TELEPHONE ( ) FOR SERVICE OR ADDITIONAL INFORMATION
MODEL: Newmac NL4 -

APPLIANCE INITIAL TEST INFORMATION

1		**FUEL INPUT (USGPH)**
2		**FUEL PRESSURE (PSIG)**
3		**FLUE PRESSURE (INCHES WC)**
4		**OVERFIRE PRESSURE (INCHES WC)**
5		**NOZZLE ANGLE/PATTERN**
6		**CO_2 PERCENT**
7		**BURNER MODEL**
8		**FLUE GAS TEMPERATURE (°F)**
9		**ROOM TEMPERATURE (°F)**
10		**SMOKE NUMBER (BACHARACH)**
11		**FUEL GRADE NUMBER**
12		**SUPPLY PLENUM STATIC PRESSURE (INCHES W.C.)**
13		**SUPPLY AIR TEMPERATURE (°F)**
14		**RETURN AIR TEMPERATURE (°F)**
15		**AIR TEMPERATURE RISE (°F)**
16		**LIMIT CONTROL FUNCTIONING PROPERLY**
17		**PRIMARY CONTROL SHUT OFF TIME (IGNITION FAILURE)**
18		**PRIMARY CONTROL SHUT OFF TIME (FLAME FAILURE)**

NOTES

OIL FIRED FURNACE – WARRANTY

Effective October 1, 2001 and subject to the following conditions Newmac Manufacturing Inc. warrants the Oil Fired Furnace, to the original owner purchaser, under normal use and repair against defects in workmanship and materials for a period of one calendar year from the date of original installation. This warranty does not cover nozzles, filters, belts etc.
The burner, blower, motors, controls or any other electrical or mechanical components not manufactured by Newmac are warranted for a period of one year from date of original installation by their respective manufacturers; burners 3 years.
Except as listed below, the primary heat exchanger is warranted for a period of 10 years under conditions of normal use.
Under this warranty Newmac Mfg. at its option will repair or replace the heat exchanger under the above terms or offer the then current applicable retail price of a heat exchanger towards a new equivalent furnace. Proof of original purchase will be required.
The warranty must be registered within 30 days of installation or the following 5 year pro-rated warranty applies.
Where the furnace is installed in a greenhouse other commercial application, Newmac warrants the primary heat exchanger against defects in materials and workmanship under a 5 year pro-rated warranty subject to the conditions and exceptions listed below on a prorated basis as follows of the then current retail price

0 – 1	Years	100%	Warranty	Owner to pay	0%	Of Retail Price
1 – 2	"	80%	Pro-rated warranty	"	20%	"
2 – 3	"	60%	"	"	40%	"
3 – 4	"	40%	"	"	60%	"
4 – 5	"	20%	"	"	80%	"
5YEARS AND OVER	"	0%	"	"	100%	"

The purchaser must pay all other costs of warranty service including labour costs involving diagnostic calls and or removing, servicing and or replacing warranty parts and or warehousing charges and or freight costs. All parts are supplied F.O.B. Debert, Nova Scotia and the defective parts must be returned freight prepaid for repair and or warranty consideration when requested by Newmac Mfg.
The furnace warranty is void if the furnace is operated, installed in or exposed to an atmosphere that contains corrosive materials either air borne or otherwise.

CONDITIONS
This warranty refers to the primary combustion heat exchanger.
In order for this warranty to be effective:
1. The furnace must be installed by a qualified licensed installer and in accordance with Newmac's installation instructions. The furnace must also be installed in accordance with all applicable, local states, or provincial codes and the National Warm Air Heating and Air Conditioning Association Standards or generally accepted equivalent standards.
2. The furnace must operate in an environment not contaminated by halogens (such as but not limited to fluorine or chlorine) or chlorinated hydro carbons. These corrosive chemicals entering the combustion area cause rapid deterioration of inner surfaces leading to heat exchanger failures. The furnace must be maintained and cleaned on an annual basis by qualified personnel; air filters should be changed monthly. Oil filters and nozzles must be changed annually.
3. The furnace must be sized and fired correctly as stated on the label. The label must not have been defaced or removed.
4. The furnace must not be modified from its published design or purpose and or an air conditioning coil shall not be installed on the return air side of the furnace.
5. Furnace must not have been removed from the original installation site.
6. There must be adequate return air and or ductwork.
7. There must be adequate provision for combustion and ventilation air to the furnace room.
8. Warranty components may be replaced with reconditioned parts at the discretion of Newmac Mfg.
9. Proof of original purchase will be requested under this warranty.

EXCEPTIONS
1. All labour, freight or diagnostic calls, removal and replacement costs and warehousing charges are the responsibility of the purchaser including the return to Debert, Nova Scotia of defective parts.
2. Defects or damages caused by failure of the refractory chamber, improper installation, wiring, electrical current characteristics, accident, misuse or abuse, fire, flood, alteration and or misapplication of the product, default or delay in performance; caused by war, government restrictions, restraints, strikes, material or freezing.
3. Refractory chamber, nozzles, air filters, belts etc...
4. Defects or damages caused by nozzle failure and/or plugging and/or oil flow restrictions due to cold oil from outside tanks or misalignment of burner at installation.
5. This warranty in no way can be considered as a guarantee of workmanship of an installer connected with the installation of the Newmac Oil Fired Furnace or as imposing on Newmac any liability of any nature for unsatisfactory performance as a result of faulty workmanship in the installation which liability is expressly disclaimed.
6. This warranty will not be applicable if the furnace is damaged or a result of being improperly serviced or operated.

LIMITATIONS ON WARRANTY
Newmac will make no express warranties other than the warranty set forth above. All implied warranties including the implied warranties of a merchantability and fitness for a particular purpose are limited to the duration of the express warranty, set forth above. Liabilities for incidental and consequential damages are excluded regardless of the cause. Some provinces in Canada and some states in the U.S.A. do not allow limitations on how long an implied warranty lasts so the above may not apply to you. The expressed warranties made in this warranty are exclusive and may not be altered, enlarged or changed by any distributor, dealer or any other person whatsoever. All replacement parts whether new or remanufactured, assume as their warranty period on the remaining period of this warranty.
For routine service requirements contact the dealer who installed the equipment originally, or an alternate qualified and registered heating dealer or electrical.

To register your warranty, please complete form below, detach and mail to Newmac Mfg. Inc. P.O. Box 9, Lancaster Crescent, Debert, N.S, B0M 1G0, Canada

---

LIMITED LIFETIME WARRANTY REGISTRATION

_____ _____
Owner's Name Date of Installation

_____
Address of Installation

_____ _____
Dealer's Name Dealer's Address

_____ _____
Furnace Serial Number Furnace Model Number